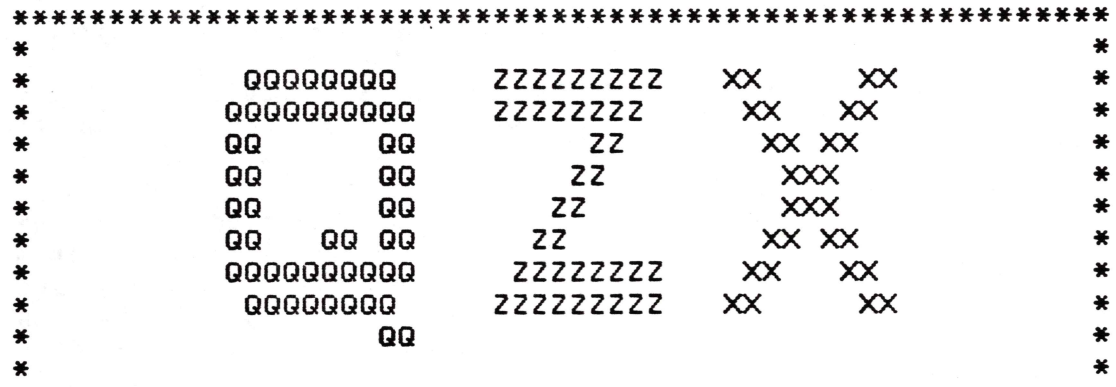
QQQQQQQQ ZZZZZZZZZ XX XX
QQQQQQQQQQ ZZZZZZZZ XX XX
QQ QQ ZZ XX XX
QQ QQ ZZ XXX
QQ QQ ZZ XXX
QQ QQ QQ ZZ XX XX
QQQQQQQQQQ ZZZZZZZZ XX XX
QQQQQQQQ ZZZZZZZZZ XX XX
QQ

The Journal Covering Amateur Radio & Sinclair Computers
ZX80; Micro-Ace; ZX81; TS1000, 1500, & 2068; QL; Z88

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88001

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EDITOR'S NOTES
K5XY

I am fortunate that QZX has not fallen any further behind as I have just returned to Las Cruces from a project meeting which took place at the Argonne National Laboratory in Illinois. The project was to revise a nuclear electronics laboratory book for the International Atomic Energy Agency.

It was a very interesting meeting and I learned a lot about both electronics and computers. The group heavily used four computers, two laser printers, and one large dot matrix printer. A Hewlett Packard scanner saw heavy usage too. Three of the computers were equiped with mice (or rather one mouse each), although I had no occasion to use one.

Ventura Publisher was used to produce camera ready copy, WORD was used to churn out the text, and ORCAD was used to create the drawings for the text. The scanner was used to put the new ORCAD drawings, as well as the still usable old drawings, into the book.

One of the things I learned was just how much memory a small drawing takes. An average full page circuit drawing took about one megabyte of memory. The hard disk on the machine soon became full. The director of the project kept sending out for another box of high density 5 1/4 inch disks to use as backups. He started to worry about how he was going to get all these disks back to Austria in his already full baggage. Fortunately we were located near an Elek-Tek discount store which was having a sale on boxes of these disks.

It was clear why none of our computers would have been used on this project. Reliable and fast permanent storage was an essential. Even the best tape based system would not have been satisfactory. All the hard and floppy disks worked without even one error or one retry. Of course, all these computers cost many times what our computers cost and the color displays used were not up to the quality of the QL and T/S2068.

The group was made up of one person from Austria, one from Yugoslavia, one from Portugal, and two from the US. I asked the man from Portugal about the Timex factory in his homeland. He had a discouraging report about the real effort which his government had made to encourage the computer industry in his country. Things were not going well.

Everybody was interested in the lastest electronic gadgets for sale in the Chicago area discount stores. Most of the items purchased however, were made in Japan, or at least Asia.

All of the software used was US developed though.

I did get one US developed gadget which proved to be very useful. It was a small pocket sized Franklin combined spelling checker and thesarsus purchased at the local K-Mart store. It proved to be better than the spelling checker which came with the word processor used; although it did not offer the same ease of correction for the misspelled word. (On the back it says "Made in Korea".)

To change the subject a bit, I mention that it is impossible for me to predict the response to articles in QZX. I received more immediate mail commenting on the somewhat less that earth shaking, short article on writing dates which appeared in the last issue than on any other article published recently. Mel, KB4NED, commented that for consistancy and ease of use in string variables, the abbreviations for the months should all be the same length and suggested that another letter be added to all the single letter abbreviations listed in the table.

RPT-1000

REPEATER CONTROLLER

YOU CAN BUILD A REPEATER CONTROLLER WITH TS1000 AND PARALELL INTERFACE, AND APPROPRIATE SOFTWARE.

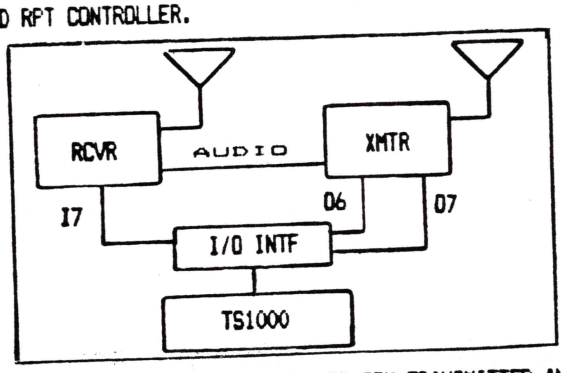
AN USEFUL MACHINE LANGUAGE ROUTINE WAS WRITTEN SOME YEARS AGO BY LU1BUV, AS A RPT CONTROLLER. I HAVE PUT SOME HARDWARE IMPROVEMENTS AND ADAPTED TO PARALELL INTERFACE OF QZX OCTOBER 1988.

THIS ASSEMBLER ROUTINE HAVE THE FOLLOWS BASIC FUNCTIONS:

1) ON/ OFF TRANSMITTER

2) IDENTIFICATION OF RPT IN MORSE CODE

YOU CAN SEE BELOW A BLOCK DIAGRAM OF A SOFTWARE BASED RPT CONTROLLER.



TWO LINES TO TAKE PLACE BETWEEN TRANSMITTER AND INTERFACE: O7 AND O6

IF LINE "O7 PTT TX" IS HIGH (5V), TRANSMITTER IS ON, AND IF O7 IS LOW (0V) TRANSMITTER IS OFF.
IF LINE "O6 IDENTIFIER" IS HIGH, THEN ACTIVATE A TONE GENERATOR FOR CW IDENTIFICATION, AND IF O6 IS LOW TONE GENERATOR IS DEACTIVATED.

THE LINE I7 BETWEEN RECEIVER AND INTERFACE IS NAMED "SQUELH". IT IS HIGH WHEN THE SQUELCH OF RECEIVER IS ON (ACTIVATED BY A TRANSMISSION) AND IT IS LOW WHEN THE RECEIVER SQUELCH IS OFF (ABSENCE OF SIGNAL).

PROGRAM NOTES:

BYTE AT ADDRESS 16516 IS TIMER IDENTIFIER ("1" IS EACH 51 SECONDS AND "255" IS EACH 3 HOURS, YOU WILL CHOOSE VALUE BETWEEN 1 AND 255).

TIMER OF "TRANSMITTER TAIL" IS ADDRESSED AT 16517 (IS A 50-SECONDS TIMER TO DISABLE REPEATER TRANSMITTER PROVIDED FOR FAIL-SAFE OPERATION. THIS TIMER RESETS DURING PAUSES BETWEEN TRANSMISSIONS. NOT INTERFERE WITH NORMAL COMMUNICATIONS.)

IN ADDRESS 16519/16520 IS ALSO TIMER OF IDENTIFIER.

ADDRESS 16521 TO 16551 IS CW TEXT OF RPT IDENTIFIER, WHERE 3 IS DASH, 1 IS DOT AND 0 IS PAUSE (IN ML LIST YOU CAN READ "K5XY RPT").

IMPROVEMENT:

TWO TYPES OF PERIPHERAL I/O YOU NEED WITH THE ABOVE ROUTINE AS CORE (AND C.O.R.), IF YOU WANT HAVE A MORE SOPHISTICATE REPEATER CONTROLLER (Fig 1):
A) IMPUT FROM A DMTF TONE DECODER FOR AUTOPATCH ACCESS AND OPERATOR FUNCTIONS.

THE DECODER USES AN ITT 3201 TONE-DECODER CHIP THAT REQUIERES A MINIMUN OF EXTERNAL PARTS FOR OPERATION: A 3.58MHz (COLOR-BURST FREQUENCY) CRYSTAL AND A IMPUT FILTER TO KEEP OUT THE TONE HARMONICS.

THE ITT 3201 IC CONTAINS ALL THE HIGH- AND LOW-GROUP FILTERS AND OTHERS CIRCUITS NEEDED FOR DTMF DECODING. IT EVEN HAS AN OPTION OF HEXADECIMAL OR BINARY OUTPUT AT PIN 2.

WHEN 3201 DETECTS A VALID DIGIT, PIN 19 "DIGIT VALID" GOES HIGH.

THE DATA VALID SIGNAL IS HIGH (5V=1) ONLY DURING VALID TONE INTERCEPTION, SO USING THIS VALUE AS THE MOST SIGNIFICANT BIT SERVES AS A FLAG TO THE PROGRAMMER THAT THE LESSER SIGNIFICANT BITS REPRESENT A TONE BEING DETECTED (SEE Fig 1 AND Fig 2).
B) OUTPUT TO A SET OF RELAYS TO CONTROL ELECTRICAL DEVICES SUCH AS LINEAR AMPLIFIER, TRANSMITTER ON/OFF, LIGHTS AT REPEATER SITE, ETC.

UP TO SIX RELAYS MAY BE USED TO CONTROL DEVICES AT THE REPEATER SITE. THE SAME CIRCUITRY SEEN ON O0 AND O1 IN Fig 3 MAY BE USED ON O2, O3, O4 AND O5. IF YOU NOT NEED ALL SIX, SO ONLY BUILD AS MANY AS YOU NEED.

YOU MUST WRITE THE APPROPRIATE SOFTWARE BASED ON PRINCIPLES EXPLAINED IN PROGRAM "TEST" IN QZX OF OCTOBER 1988, IN ADDITION TO ROUTINE CORE.

CARL NEIHART, KE5BX, IN QST NOV 1983 HE HAD WRITTEN A FLOWCHART OF ONE OF THE MANY POSSIBLE ALGORITHMS FOR A BASIC REPEATER CONTROLLER.

HE SAID "IN SHORT, THE SKY'S THE LIMIT, WHATEVER CAN BE DONE WITH A REPEAT AND DMTF REMOTE CONTROL CAN BE PROGRAMMED BY YOU IN BASIC".

AMEN...

73's, GUILLERMO (LU8MAD)

RPT CONTROLLER

```
16514 24 37        JR 16553
16516 3
16517 255
16518 255
16519 255
16520 255
16521 3            "K"
16522 1 3 0
16525 1 1 1        "S"
16528 1 1 0
16531 3            "X"
16532 1 1 3
16535 0
16536 3            "Y"
16537 1 3 3
16540 0
16541 1 3 1        "R"
16544 0
16545 1 3 3        "P"
16548 1 0 3        "T"
16551 0
16552 255
16553 205 54 65    CALL 16694
16556 230 128      AND 128
16558 202 12 65    JP Z,16652
16561 62 255       LD A,255
16563 50 134 64    LD (16518),A
16566 205 57 65    CALL 16697
16569 205 54 65    CALL 16694
16572 230 128      AND 128
16574 202 218 64   JP Z,16602
16577 205 71 65    CALL 16711
16580 58 134 64    LD A,(16518)
16583 61           DEC A
16584 50 134 64    LD (16518),A
16587 32 236       JR NZ,16569
16589 205 54 65    CALL 16694
16592 230 128      AND 128
16594 205 65 65    CALL 16705
16597 32 246       JR NZ,16589
16599 195 169 64   JP 16553
16602 62 255       LD A,255
16604 50 133 64    LD (16517),A
16607 205 71 65    CALL 16711
16610 58 133 64    LD A,(16517)
16613 61           DEC A
16614 50 133 64    LD (16517),A
16617 32 244       JR NZ,16607
16619 205 54 65    CALL 16694
16622 230 128      AND 128
16624 194 185 64   JP NZ,16569
16627 205 65 65    CALL 16705
16630 58 132 64    LD A,(16516)
16633 61           DEC A
16634 50 132 64    LD (16516),A
16637 194 169 64   JP NZ,16553
16640 62 3         LD A, 3
16642 0
16643 50 132 64    LD (16516),A
16646 205 82 65    CALL 16722
16649 195 169 64   JP 16553
16652 205 71 65    CALL 16711
16655 58 135 64    LD A,(16519)
16658 61           DEC A
16659 50 135 64    LD (16519),A
16662 194 169 64   JP NZ,16553
16665 62 255       LD A,255
16667 50 135 64    LD (16519),A
16670 58 136 64    LD A,(16520)
16673 61           DEC A
16674 50 136 64    LD (16520),A
16677 194 169 64   JP NZ,16553
16680 62 30        LD A,30
16682 50 136 64    LD (16520),A
16685 205 82 65    CALL 16722
16688 205 65 65    CALL 16705
16691 195 169 64   JP 16553
16694 219 243      IN A,243
16696 201          RET
16697 245          PUSH AF
16698 175          XOR A
16699 203 255      SET 7,A
16701 211 243      OUT 243,A
16703 241          POP AF
16704 201          RET
16705 245          PUSH AF
16706 175          XOR A
16707 211 243      OUT 243,A
16709 241          POP AF
16710 201          RET
16711 197          PUSH BC
16712 1 255 255    LD BC,65535
16715 11           DEC BC
16716 120          LD A,B
16717 177          OR C
16718 32 251       JR NZ,16715
16720 193          POP BC
16721 201          RET
16722 33 137 64    LD HL,16521
16725 126          LD A,(HL)
16726 254 255      CP 255
16728 200          RET Z
16729 254 0        CP 0
16731 32 4         JR NZ,16737
16733 6 1          LD B,1
16735 24 8         JR 16745
16737 71           LD B,A
16738 175          XOR A
16739 203 255      SET 7,A
16741 203 247      SET 6,A
16743 211 243      OUT 243,A
16745 62 30        LD A,30
16747 205 71 65    CALL 16711
16750 61           DEC A
16751 194 107 65   JP NZ,16747
16754 16 245       DJNZ 16745
16756 175          XOR A
16757 203 255      SET 7,A
16759 211 243      OUT 243,A
16761 35           INC HL
16762 195 85 65    JP 16725
```

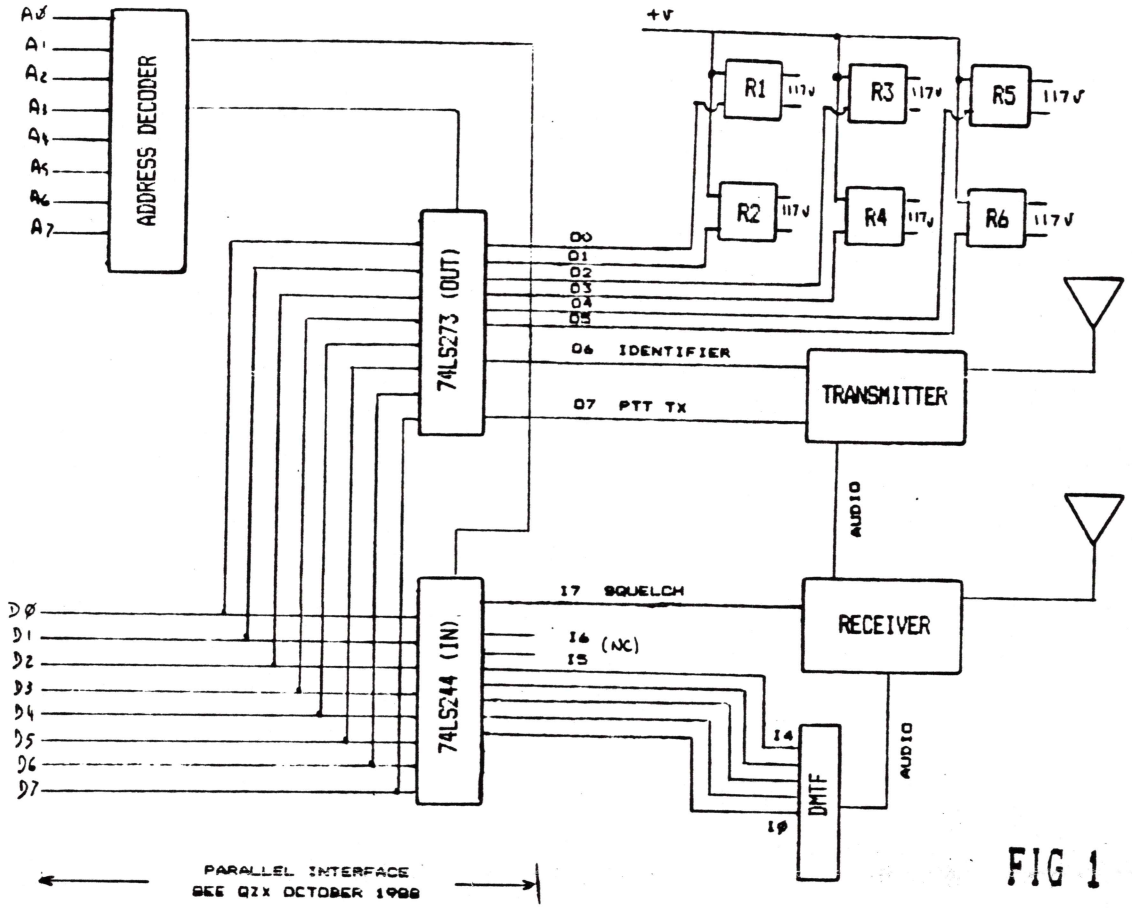


FIG 1

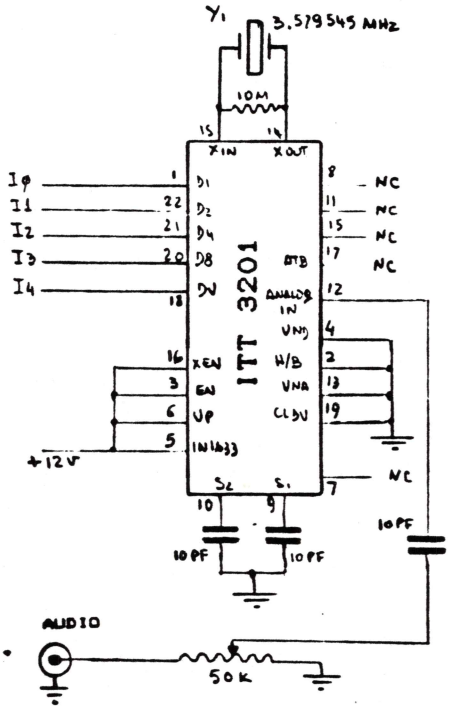


FIG 2

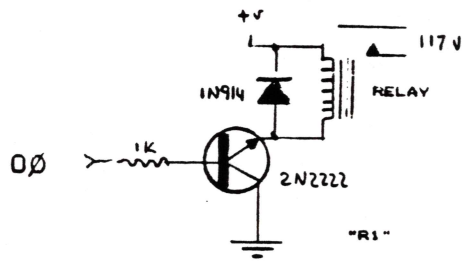
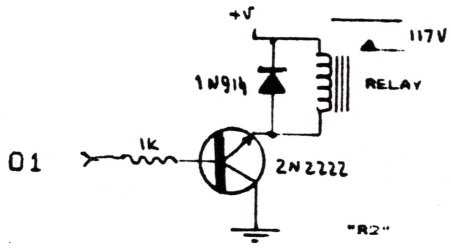


FIG 3



QL DATA INTERFACE 3

K5XY

This article is a continuation of the articles, QL Data Interface 1,2, and 3 from past issues, about the Prairie Digital Data Acquisition System for the QL. This is the last article in the series. All the hardware features have been covered in previous articles, including the one last month which reported on the actual use of the board. This article will mention some programing possibilities.

The analog to digital converter (ADC) requires a very specific control sequence in order to complete and write out a conversion. Below is a BASIC program which performs all of the necessary I/O instructions to take a reading of the voltage at channel 0. (This is pin 21A of the user connector.) If you look at the schematic from one of the previous articles, you will see that channel 0 os connected to the ADC chip input because lines A, B, and C of the multiplexor (MUX) are grounded. BASIC performs all the required steps at approximately three conversions per second. For faster reading rates, the equivalent routine could be compiled or written in assembler.

Simple BASIC ADC program

```
100  CLS
110  POKE 81923,131 :REMark set up I/O port, A=out, B=in,
                      C-low=in, C-hi=out.
120  POKE 81922,192 :REmark chip select high, clk high
170  R = 0
180  POKE 81922,64  :REMark   clk high
190  FOR J = 7 TO 0 STEP -1
200  R = R + ((PEEK (81922)&&8)/8)*2^J  :REMark read port C, mask
                                         D0-D6 construct reading
210  POKE 81922,0   :REMark  clk low
220  POKE 81922,64  :REMark  clk high
230  NEXT J
240  PRINT INT((R*500/256))/100    REMark  convert to voltage
250  GOTO 170
```

In the above program, line 100 just clears the screen of whatever was on it before the ADC program was run. Line 110 sets up the computer to control the ADC card and to read the digital value that it measures. The number poked into memory location 81923 sets up the port as shown in the REMark according to the scheme detailed in a previous article. Line 120 initializes the ADC chip. The ADC chip reads its measurment out serially one bit at a time according to the signal on the clk input. Line 170 initializes the voltage reading to zero. Line 180 insures that the clk line is high here. Line 190 sets up the loop which clocks the voltage reading out of the ADC one bit at a time. Line 200 is a key line. It builds up the voltage reading bit by bit. Here it first reads port C. The reading is then "anded" with 8 to mask off bits 0 to 6. The result is then divided by 8 which will only leave a 1 or a 0. This is then properly weighted by multiplying by 2 raised to the power of J and finally added to the previous value of R to get a value for the voltage. Lines

210 and 220 clock the next bit out for use in line 200. Line 230 ends the loop, with R containing a number proportional to the decimal equivalent of the voltage on the input to the ADC card. One of the tasks of line 240 is to take R and convert it to units of voltage. The 500 in the line represents the highest voltage which the ADC chip will accept (5.00). The 256 represents the 256 different values that this 8 bit chip can assign the measured voltage. The 100 just sets the decimal point. Then the line prints the answer in very unadorned fashion. On the empty screen the number appears in the upper left corner and subsequent readings are printed on the line below at the rate of about three readings per second. When the line of numbers reaches the bottom of the screen, the old numbers start scrolling off the top as new readings are put in the lower left corner.

This program just reads the voltage on one of the eight possible input lines. A few additional program lines will permit as many of the other seven input lines as you wish to be read in turn. To read the voltage applied to the other channels, all that is needed is to add the necessary MUX program statements and configure the user connector. The MUX inputs (A0, A1, ans A2) are not connected internally on the printed circuit board in order to leave the user the most flexibility. In the example below the MUX inputs A0, A1, and A2 are tied to PA0, PA1, and PA2 on the user connector to receive signals from the computer as commanded by the lines in the programming addition shown below. These additional lines replace original lines or add to the original program.

Additions to the simple program

```
130  POKE 81922,0:  POKE 81922,64
140  FOR CHANNEL = 0 TO 7
150  POKE 81920,CHANNEL:  REMark set up the MUX
160  FOR Z = 0 TO 7: POKE 81922,0:  POKE 81922,64:  NEXT Z

240  AT CHANNEL * 2,16:  PRINT "       VOLTS"
250  AT 2 * CHANNEL,5:  PRINT "CHANNEL ";CHANNEL;" = "; INT ((R *
     500/256))/100
260  NEXT CHANNEL
270  GOTO 140
```

(Adjust CHANNEL and Z as required.) Note that the more channels which are read, the longer the time between readings of a given channel. Also note that the PRINT statements are a little more complicated to provide labels for the voltage readings. Of course, the labels could be made more meaningful for your particular application.

Many more complicated programs could be written. The data could even be graphed. The first useful addition that comes to mind is a program which would print the voltage reading in large numbers in the center of the screen. One would then have a very nice demonstration voltmeter.

If any reader creates a more sophisticated program, QZX would be glad to hear of it.

The final product can be used wherever a voltmeter is used. (Perhaps with an appropriate voltage divider to keep the input less than 5 volts. If an attenuator is used, changing the 500 in line 240 will cause the ADC card to give the answer in terms of the unattenuated input. The end result could be used as an S meter, FM receiver deviation meter, line voltage monitor, or even a monitor of the QL power supply. Write up your use and share it with other QZX readers.

UNCLASSIFIED ADS

WANTED: UNCLASSIFIED ADS for publication in QZX. Cost is 1 cent for each keystroke (characters, blanks, etc.). Payment must be included with order. This is an excellent way to sell your program or unwanted equipment, ask for help, or find a specific program. Send your ad with payment to QZX, 2025 O'Donnell, Las Cruces, NM 88001.

QZX Discount: 15% discount on all orders mentioning QZX. T & C Services (address in ad this issue.)

WANTED: RS232 interface card, prefer an already built card or kit as 2nd choice for a T/S2068 computer. Stuart L Ballinger, 11 Lown CT., Poughkeepsie, NY 12603-3321 or phone #(914) 452-2482 locally.

WANTED: Serial printer interface for 2068, with software and documentation. Jim Dodrill, 4122 Wallingford Lane, Louisville, KY 40218. Ph 1-502-491-4122

WANTED: Documentation for DF mapped universal I/O port by Tom Woods. Interface board designed by J./ Oliger. Software required for T/S1000 application. Edward L. Radtke, 1602 Woodluck Ave., Louisville, KY 40205.

QZX FRIENDS

WD9CRD -- William says that he has spent the last two years looking for QZX in bookstores until he finally got my address. He is interested in using his T/S2068 for WEFAX pictures.

W1SPP -- Ed sent a very generous contribution to the stamp fund.

KV3Q -- Bob made a contribution to the stamp fund too, although he did not know it. The stamp on his renewal letter escaped the canceling machine.

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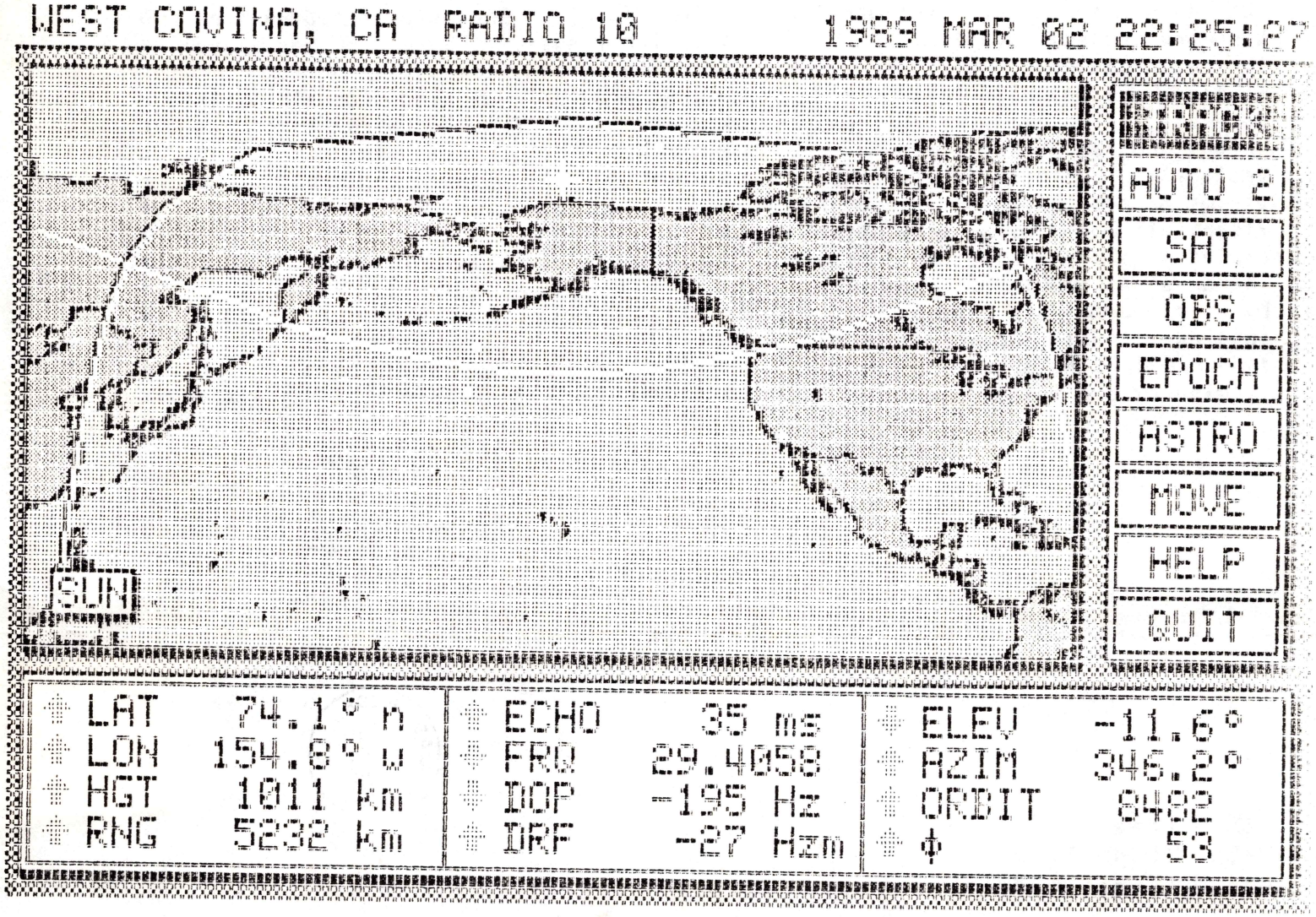

73, K5XY

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